June 9, 2005

Mr. James C. Strozier, REHS
Hazardous Waste Specialist
Orange County Health Care Agency
Environmental Health
1241 East Dyer Road, Suite 120
Santa Ana, CA 92705-5611

RE: Supplement to February 11, 2005 UST Site Closure Request

SITE: Crown Valley Car Wash
25991 Crown Valley Parkway
Laguna Niguel, Ca
OCHCA Case #86UT179

Dear Mr. Strozier

Aqua Science Engineers, Inc., (ASE) has prepared a supplement to the February 11, 2005 site closure request report that includes information on the history and fate of benzene and TBA in groundwater at the Crown Valley Car Wash site. This supplement, and the Second Quarter 2005 Groundwater Monitoring Report dated June 1, 2005 included with this supplement, are intended to be the final submittals of environmental data by the responsible party to the Orange County Health Care Agency for the evaluation of site closure.

Benzene

Figure 1 attached is a site map showing well locations and the latest chemical analysis data for groundwater. Table 1 attached is a historical summary of groundwater chemical analysis data for this site. Over the past two years, the highest concentrations of benzene have been detected in samples collected from well MW-2R. Well MW-2 was re-drilled during June 2003 for dual-phase groundwater remediation. This well is located near the area where gasoline released prior to 1986 appeared to be accumulating. Releases of gasoline prior to 1986 at this site apparently did not contain MTBE.

As indicated in Table 1, and as illustrated on Figure 2, concentrations of benzene in groundwater samples from well MW-2R have ranged widely from 97 μg/l to 3,040 μg/, with an average concentration of 1,506 μg/l and a geometric mean concentration of 868 μg/l. Groundwater samples collected near contamination source areas tend to have the widest ranges of contaminant concentrations detected over extended monitoring periods. Energy introduced by the action of well sampling can lead to the localized mobilization of gasoline in the saturated zone resulting in widely inconsistent contaminant concentrations detected from one sampling event to the next. These conditions introduce uncertainty in sampling and may not reflect equilibrium conditions.

The remaining wells at this site have contained generally low concentrations of benzene over the past three years. Well MW-4 is located approximately 15 ft. down-gradient of well MW-2R (Figure 1). Concentrations of benzene in this well over the past three years have ranged from not detected to 466 μg/l, with an average concentration of 103 μg/l and a geometric mean concentration of 37 μg/l. The differentials between the average and geometric mean concentrations of benzene in wells MW-2R and MW-4 are in the range of a factor of 15 and 20, respectively. A straight linear regression of benzene concentration between wells MW-2R and MW-4 reflects a decrease of 94 μg/l (average concentration) and 55 μg/l (geometric mean concentration) per foot of horizontal distance traveled. This condition suggests that the higher concentrations of benzene detected in groundwater samples from well MW-2R are highly localized and do not extend to any great distance beyond this area. Physical factors influencing the restriction of benzene migration likely include sorption to organic carbon and clay soil in the saturated zone. Other factors include the biological degradation of benzene resulting in destruction of benzene mass. Factors not reflective contaminant mass loss include dispersion and dilution.

Tertiary Butyl Alcohol (TBA)

Figure 4 is a plot of TBA concentrations verses time in wells MW-1, MW-4, R-7 and OM-5. Samples collected from well MW-4 have historically contained the highest concentrations of TBA and the most consistent detections of this contaminant from one monitoring period to the next. The remaining wells have contained generally low to non-detectable concentrations of TBA with sporadic detection. It is suspect that the majority of TBA at this site is a product of the anaerobic biological degradation of MTBE. Natural attenuation of TBA has been demonstrated to occur in aerobic or oxidizing conditions in groundwater. TBA also adsorbs to organic carbon at a rate of approximately 1.5 times that of MTBE (log Koc = 1.57).

Table 2 provides May 19, 2005 oxidation-reduction potentials (ORP) for groundwater from each well at the site. Groundwater from wells MW-1, MW-3, R-7 and OM-5 had ORP readings ranging between 39 mV (millivolts) to 228 mV. Wells MW-2R and MW-4 had ORP readings of -110 mV and –136 mV, respectively. As described in the previous section, gasoline contamination from the original UST release appeared to accumulate near the area of well MW-4. This likely produced a rapid transformation of groundwater in this area from an oxidizing to a strongly reducing environment. This condition persists as indicated by the ORP readings from wells MW-2R and MW-4. While MTBE is transformed to TBA under these conditions, TBA will tend to accumulate in a strongly reducing environment. This condition, along with the low permeability of the water-bearing zone at this site, appears to result in an accumulation of TBA in the area of well MW-4.

Figure 3 attached is a plot of MTBE concentrations verses time in wells MW-1, R-6 and OM-5. The current groundwater chemical analyses data supports the conclusion that MTBE concentrations have peaked and continue to decrease at this site. Figure 6 is a plot of TBA and MTBE concentrations verses time for well R-7. The plot reflects a relatively steep decline in MTBE concentration from a peak of 1,100 μg/l in April 2003 to the current low of 25.5 μg/l in

the May 2005 sample. It is anticipated that the depletion of MTBE in this area will result in a rapid reduction in the formation of TBA, and a somewhat slower reduction in TBA concentration near well MW-4 as natural attenuation factors take effect. Chemical analysis data collected from well MW-4 suggests TBA concentrations have also peaked and are decreasing. Chemical analysis data from well OM-5 located down-gradient of the site indicates TBA is not reaching this well. It is suspected that TBA is attenuating at a relatively rapid rate as it migrates with groundwater from areas of reducing conditions to areas of oxidizing conditions by aerobic biological degradation, and abiotically by dilution and adsorption to the organic carbon content of soil in the saturated zone.

Conclusion

As stated in the February 11, 2005 site closure request report, it is opinion of Aqua Science Engineers, Inc., that the Crown Valley Car Wash site should be considered for closure regarding past releases of gasoline from the UST system based on the following rational:

- The Moulton-Niguel Water District has no existing or future plans to utilize groundwater in this area for municipal supply. The Moulton-Niguel Water District imports all of its municipal water supply and maintains no municipal supply wells. The nearest private irrigation well is located at the Schuller Ranch (citrus orchard) located approximately 2 miles south of the subject site.

- The hydrogeological conditions, groundwater quality and water usage in the area preclude the groundwater contamination beneath the site, as it currently exists, from posing a significant risk to surface waters, groundwater resources or human health.

Please contact me at (949) 833-3667 or (949) 852-5953 (direct line) if you have any questions.

Sincerely,

Aqua Science Engineers, Inc.

Michael Marello, R.G., C.Hg.
Vice President
Senior Hydrogeologist

attachments

cc: Mr. Bruno Scherrer